REPORT ON SEMINAR ON SCIENCE INFORMATION AND COMMUNICATION FOR FEDERAL SCIENTISTS AND ENGINEERS IN THE WASHINGTON, D.C., AREA, DECEMBER 2-6, 1963

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ABSTRACT

The Graduate School of the U. S. Department of Agriculture, with the financial assistance of the National Science Foundation, conducted a 5-day seminar on science information for 25 scientists and engineers employed by the Federal government in the Washington area. The seminar consisted of lectures, discussions, and demonstration tours of selected information activities. The course content was designed to present the participants with a broad picture of the science information field and its major problem areas. The success of the program demonstrates the feasibility of this type of short-course for scientists and engineers, and it is expected that the seminar will become a regular, self-supported offering of the Graduate School.

CONTENTS

FOREWORD

This pilot course was conducted by John Sherrod, presently with the Division of Technical Information, U. S. Atomic Energy Commission, and a member of the Graduate School faculty since 1958, and by Foster E. Mohrhardt, Director of the National Agricultural Library. Valuable assistance was provided by Ernst M. Sinauer, who served as Graduate School Coordinator.

The Graduate School wishes to express its appreciation to Miss Joan Callanan of the National Science Foundation who provided effective liaison and who participated as an observer throughout the seminar, and also to the members of the Advisory Committee: Melvin Day, National Aeronautics and Space Administration; William Evans, National Bureau of Standards; Edmund N. Fulker, Department of Agriculture Graduate School; Foster Mohrhardt, National Agricultural Library; Robert Philleo, National Institutes of Health; Robert Stegmaier, Department of Defense; and Henry Stevens, Agricultural Research Service.

For their fine cooperation in providing demonstration tours of their facilities, we wish also to thank officials of the National Library of Medicine, the Science Information Exchange, and the NASA Scientific and Technical Information Facility at Documentation, Inc.

The Graduate School would welcome comments or suggestions from any interested reader of this report.

John B. Holden
Director, Graduate School, USDA

INTRODUCTION

The Graduate School of the U. S. Department of Agriculture was established in 1921 with an objective to improve the Federal Service by providing needed educational opportunities for Federal employees. Although the name belies the facts, the Graduate School is a private, unendowed, and non-degree granting institution supported primarily by student fees. Further, the majority of the courses are offered at the undergraduate level and are open to other than Federal employees as facilities permit.

The Graduate School has been a pioneer in developing a wide range of training programs in the information field. This has been of particular value in a geographic area supporting more than 250 libraries and countless numbers of other information activies but lacking in the variety of training facilities required for people working in this rapidly expanding technology.

In 1961, for example, an organized course of study was developed to offer background information and training for the sub-professional assistant and others who require a knowledge of information techniques. Successful completion of this curriculum leads to the granting of a Certified Statement of Accomplishment in Library Techniques. This is the first formal study program designed specifically to train library technicians.

Only a short time before this, the Graduate School offered a course on the Literature of Meteorology." This was the first course ever offered professional meteorologists for the expressed purpose of assisting them with their information needs.

Out of these and similar experiences emerged the concept of a "spectrum" of educational needs in the science information field. In the middle portion of this spectrum and more clearly visible is the pressing requirement for developing increasing numbers of professionally trained librarians, documentalists, and information specialists to meet the information crisis. This job obviously belongs to the accredited, degree-granting institutions that are faced with the immediate problem of adjusting existing curricula to meet the significantly different needs of today's specialists.

At the ends of the spectrum but not as obvious are two areas that seem to show considerable promise for curricula development and for which the Graduate School has chosen to concentrate in its information program. The one is in the area of training information technicians to assist the growing cadre of professional information specialists. The other, and the subject of this report, is aimed at providing refresher or in-service training to update, in a sense, the working scientists and engineers who ultimately will reap the benefits of the new information tools and services under development.

It is within this conceptual framework that the Graduate School proposed to the National Science Foundation to conduct an experimental course of study for Federal scientists and engineers dealing with the broad field of science information. In the Fall of 1963, the Foundation awarded four grants for support of educational activities in the information field, the first of these to support the Graduate School's proposal.

PLANS AND OBJECTIVES

There was considerable speculation at conferences on training science information specialists held in October 1961 and April 1962 at the Georgia Institute of Technology and sponsored by the National Science Foundation as to the possible merits of short courses in information as a means of providing orientation and refresher training. It was apparent that not only did a need exist for training information specialists and others responsible for operating information centers and systems but that the principal users of these services, i.e., scientists or other subject specialists, conceivably would benefit from a thorough indoctrination into the techniques and processes of information systems.

While there was little agreement as to the exact content for such courses or the amount of time that should be taken, it became clear that a pilot program should be attempted.

A number of both short-and long-range objectives came to mind. And above all were overriding considerations as to the feasibility of such a course and whether working scientists and engineers would participate in a program of this kind. Based on considerable speculation, the decision finally was reached to plan a five-day seminar.

In addition to the general considerations noted earlier, the seminar aimed at accomplishing three educational objectives:

1. To acquaint participants with information services and means of utilizing them;

2. To familiarize participants with the principles and practices of storing, retrieving, and disseminating specialized information;

3. To make participants aware of problems in information handling that have been magnified by the accelerating expansion of science and technology.

In addition to these more immediate goals, the seminar was planned with the longer-range objective of motivating the participating scientists and engineers to accept the added responsibilities inherent in the communication process.

SELECTING PARTICIPANTS

A number of factors were taken into account in arriving at a target audience. The special interests of the Graduate School, the availability of potential participants, and other practical considerations suggested strongly that Federal employees would provide an excellent group for study. Experience had shown, and available space dictated, that no more than 25 participants would be included. Finally, the seminar was planned for 25 scientists and engineers at the classification level of GS-13 and above who were active in research or development and who had not performed a significant portion of their work in the information field. A list of the participants is given in Appendix A.

A call for nominees to the seminar was issued to government agencies with major R and D programs. The invitations were forwarded in early October to the heads of agencies with copies to the respective training offices. Each agency was asked to nominate two candidates by November 1 and to provide appropriate biographical data to enable a degree of selection.

Unfortunately, insufficient lead time was allowed and, combined with the poor communication in some agencies, the deadline approached without the quota being reached. Since it appeared that 25 participants might not be obtained, and since notification had to be sent to those accepted, essentially all applications were approved as received with no screening beyond that

requested in the original invitation. As it turned out, notices of the course appeared in the NSF publication, Science Information Notes, and in the AAAS journal, Science, which may have caused the number of requests to belatedly exceed the quota. The names of the few nominees who could not be accommodated in the course were kept so we could notify them in the event the course is repeated. Requests to attend the seminar were received from as far away as New Mexico.

CONDUCTING THE SEMINAR

Each day's program was planned to provide for approximately three hours of lecture and discussion in the forenoon and for demonstration tours of selected information activities during the afternoon hours. A brief outline of the program is given in Appendix B.

Lecture notes were prepared in advance of the seminar but the propensity of the participants to initiate animated discussion on a wide range of related topics made adherence to a formal outline difficult. As a consequence, the notes were abandoned midway in the first morning of the seminar.

While no homework or other outside assignments were required, a number of citations to the current literature on information were given as optional, supplementary reading material. In addition, several copies of recent monographs on information were placed in the classroom. Approximately two-thirds of the participants borrowed one or more of the texts for perusal outside of the class.

It may be of value to note here some of the topics discussed that appeared to be of particular interest to the group.

A considerable part of the introductory lecture was given to outlining the reasons for government interest in matters of acquisition and dissemi-

nation of specialized information and with developing a recent history of activities of the various Legislative and Executive groups concerned with the growing information problem. The fact that an increasing number and variety of important government officials were giving serious attention to the problem of scientific and technical information in all its ramifications appeared to provide the necessary motivation and high interest level so important for a successful beginning of any educational program.

The second day's lectures concentrated on the importance of the user, both as producer and consumer, in the information system and the need for the user to take an active role in the design and operation of the system. This was intended to further emphasize to each scientist and engineer his own responsibility in the area of information. It was made clear that subject specialists can make a serious tactical error by ignoring the challenge offered by the problems of communicating new information.

The bulk of the next two days was given to lectures and discussion on the theory and practice of information storage and, hopefully, subsequent retrieval. Topics discussed included a brief history of storage systems beginning with the earliest classification schemes and ending with the more modern concept of coordinate indexing. The discussion covered conventional, non-mechanized systems as well as the current applications of computers for

information storage and retrieval. Particular emphasis was given to the use of small, handmanipulated, punched-card systems for the maintenance of personal filing systems.

The last day concentrated on information services, foreign and domestic, that were available to scientists and engineers. Abstracting and indexing services, technical libraries, specialized information centers, and other activities were identified and their programs described.

The demonstration tours given during the afternoons proved invaluable. For many, it provided the first behind-the-scenes look at modern information activities.

EVALUATING THE SEMINAR

One of the most difficult tasks in any educational program is to measure, in a meaningful way, the changes resulting in each participant as a result of the program. Further, any changes that might be detected in one group would have to be checked and verified in subsequent groups before one could accept a causal relationship with a reasonable degree of confidence.

The positive response to the call for nominations to this course provided a degree of measure of the interest shared by technical personnel and management in a seminar of this kind. In addition, a brief evaluation form was completed by each participant immediately upon completion of the program. This questionnaire, shown in Appendix C, was used primarily to measure the "popularity" of the course.

In response to question 2, "Did your achievement match your hopes?" 14 replied "yes," 5 replied "no," and 6 replied "partly" or "to a large extent." In reply to question 4 as to over-all opinion of the seminar, 6 rated the course excellent, 12 judged it as very good, 5 rated it good, and 1 only fair. As to the last part of question 5, "Do you recommend the seminar be repeated for similar groups?" 22 replied "yes" and 3 replied "no." It can be judged that student reaction to the course was quite favorable.

In order to determine if substantive changes occurred within the participants, a general questionnaire, shown in Appendix D, was distributed to the class at

the initial session and an identical questionnaire sent to each participant approximately five months after the close of the program.

The questionnaires were analyzed to determine if any measurable differences could be noted in answers given before, and after, the seminar. While some differences were found, it is not claimed that any necessarily resulted from the course.

No large differences were found in the order of importance cited by the participants as a means for keeping informed (question 1). In both cases, journals were judged most important and books least important with the remaining choices grouped so closely together as to be indistinguishable.

In reply to the second question, it is interesting that while the number of participants stating they had experienced no difficulties in locating technical information increased from one to four, nearly 50% of the participants identified an increased number and greater variety of information problems after the five-month period had elapsed.

An analysis of question 4 showed that there was an increase of about 50% in the number of abstracting and indexing services used, from an average of less than 2 titles to more than 2 titles per participant.

The use of the library was examined in question 5. The frequency of use amounted to about once a week at the time of the seminar. This later was found to increase to about twice a week.

CONCLUSIONS

There can be no doubt that within the Federal government, at least, there is considerable interest in technical information problems, both at the working scientist and management levels. A five-day seminar, as described here, offers a practical and inexpensive way to bring increased awareness and understanding of these problems to a significant number of information users. It can be anticipated that there will be no shortage of nominees for future courses of this kind. Likewise, participants can be expected to find the course worthwhile in almost every case.

As a result of the favorable reception given this program, it is planned to make the seminar a regular, self-supported offering of the Graduate School's Special Programs.

RECOMMENDATIONS

The National Science Foundation should give serious consideration to supporting a number of experimental short courses in information for professional workers in various fields of science and technology. In order that such programs can achieve the highest degree of effectiveness, particularly in locations outside of the larger metropolitan areas, an adequate textbook designed for this kind of course together with appropriate visual and other study aids should be prepared.

The Foundation might wish to consider sponsoring a conference in this subject area in order to develop a range of meaningful objectives for such courses and, possibly, proper test procedures to aid in evaluating the relative effectiveness of different approaches to science information training.

The Foundation should plan to support annual follow-up sessions of one or two days in duration for participants in these short courses for the purposes of updating the participants as well as simplifying the various tests that will be required to measure any significant results.

APPENDIX A

LIST OF PARTICIPANTS

M. C. Ahrens
Assistant Chief
Farm Electrification Branch, AE
Agricultural Research Service

James H. Babcock
U. S. Government

Chester Ray Benjamin
Research Mycologist
Crops Research Division
Agricultural Research Service

Dr. John B. Calhoun
Research Psychologist
National Institute of Mental Health

Herman L. Croom
U. S. Government

William R. Deebel
U. S. Naval Oceanographic Office

Charles DeVore
Office of Naval Research

James A. Fava, Colonel, USAF
Office of Aerospace Research

Robert R. Hays
Office of Naval Research

Raymond R. Heer, Jr.
Office of Antarctic Program
National Science Foundation

Dr. C. W. Hiatt
Chief, Laboratory of Biophysics
and Biochemistry
National Institutes of Health

Dr. M. Isabel Irwin
Research Nutrition Specialist
Agricultural Research Service

Dr. Steven C. King
Acting Assistant Director
Animal Husbandry Research Div.
Agricultural Research Service

Dr. Roger P. Maickel
Research Pharmacologist
National Heart Institute

Dr. Henry Lea Mason
National Bureau of Standards

Dr. Richard M. Michaels
Chief, Human Factors Research Branch
Bureau of Public Roads

Louis Munan
Medical Research Scientist
Pan American Health Organization

Kaleel S. Rizk
U. S. Government

Gordon B. Sharpe
Chief, Program Development Branch
Bureau of Public Roads

I. Gregory Sohn
Research Geologist
Geological Survey

Dr. Robert Stephan
Dental Director
Oral Medicine and Surgery Branch
National Institute of Dental Research

Robert C. Stirling
Scientific Staff Assistant
U. S. Naval Oceanographic Office

Herbert B. Taylor, M. D.
Chief, Obstetric, Gynecologic & Breast Pathology Branch
Armed Forces Institute of Pathology

Dana L. Thompson
Air Force Office of Scientific Research, OAR

George Yip
Section Chief
Food and Drug Administration

APPENDIX B

GRADUATE SCHOOL
U. S. DEPARTMENT OF AGRICULTURE
Room 1100 LaSalle Building
1028 Connecticut Avenue, N.W.

Seminar
on
SCIENCE INFORMATION AND COMMUNICATION
December 2 - 6, 1963

PROGRAM

Monday, December 2

9:00 AM Welcome to Graduate School

Remarks
Ernst M. Sinauer, Coordinator

9:15 AM Session I
A Systematic Approach to Information and Communication
Foster E. Mohrhardt
John Sherrod

2:00 PM Demonstration tour, National Library of Medicine
Bethesda, Maryland

Tuesday, December 3

9:00 AM Session II
Use and Users of Scientific and Technical Information
John Sherrod

12:30 PM Group Luncheon, Occidental Restaurant, 1411 Pennsylvania Avenue, N. W. (International Room)
Speaker: E. G. Hill, Principal Scientific Officer
Department of Scientific and Industrial Research
United Kingdom

Tuesday, December 3 (Cont'd)

2:00 PM Demonstration tour, Science Information Exchange
1730 M Street, N. W.

Wednesday, December 4

9:00 AM Session III
Theory and Practice of Information Storage and Retrieval
John Sherrod

2:15 PM Presentation on Citation Indexing
Institute for Scientific Information
East Room, Hotel Mayflower

Thursday, December 5

9:00 AM Session IV
Theory and Practice of Information Storage and Retrieval,
Continued
John Sherrod

2:00 PM Demonstration tour, NASA Technical Information Facility
(Documentation, Inc. Rugby Avenue, Bethesda, Md.)

Friday, December 6

9:00 AM Session V
Information Services and How to Use Them
Foster E. Mohrhardt
John Sherrod

12:30 PM Group Luncheon, Rhein Restaurant, 1234 - 20th Street, N. W.
Henry Stevens, "Scientists in Agricultural Research"

Friday, December 6 (Cont'd)

2:00 PM Discussion and Review of Seminar
Foster E. Mohrhardt
John Sherrod

Remarks
Ernst M. Sinauer

Presentation of Certificates

APPENDIX C

EVALUATION FORM

1. What did you hope to achieve by attending this seminar?

2. Did your achievement match your hopes?

3. What suggestions do you have for improving this seminar?

4. Please indicate your over-all opinion of the seminar by checking the appropriate blank:
( ) Excellent ( ) Very Good ( ) Good ( ) Poor

5. What aspect of the seminar did you like best?

6. What aspect did you like least?

7. Do you recommend the seminar be repeated for similar groups?

APPENDIX D

We would like your cooperation in answering the following questions in order that we may gain some understanding of the group's behavior as it relates to the generation of information and needs for information services.

1. Indicate in the order of importance (1 most important, 2 next, etc.) the following means that you employ to keep currently informed of subjects related to your research work. Use 0 if no importance.

Meetings, conferences, seminars	_____
Abstracting and indexing services	_____
Journals	_____
Personal Contacts	_____
Technical reports	_____
Organization Library	_____
Books	_____

2. List the 3 biggest difficulties that you have experienced during the past year in locating technical information that you desired. If no difficulties, indicate none.

a.

b.

c.

3. What is the method you depend on most for becoming aware of foreign developments connected with your work?

4. List the abstracting and indexing services, if any, that you have used in the past 6 months.

5. How long has it been since you used a library?
Describe that use briefly.

6. How many formal reports have you written in connection with your work during the past 12 months that were intended for publication? _____

7. In connection with your professional reading and study, do you maintain a personal note taking and filing system? If so, please describe briefly below.

Your Name_____